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CENTRAL FAX CENTERSerial No. 09/851,313
Docket No. NEC01P069-MSb

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JAN 30 2008

AMENDMENTS TO THE CLAIMS:

Please cancel claims 4, 8, 35, 48, 50-52 and 55-56 without prejudice or disclaimer.

1. (Currently amended) A semiconductor device, comprising:

 a multi-layered insulation film formed on a semiconductor substrate, said multi-layered insulation film comprising:

a methyl silsequioxane (MSQ) layer a first insulation layer comprising an organosiloxane film having a dielectric constant which is lower than a silicon oxide dielectric constant;

a methylated hydrogen silsesquioxane (MHSQ) layer formed on and being in contact with said MSQ layer a second insulation layer comprising a polysiloxane compound having an Si-H group and formed on and adhering to a top of said organosiloxane film of said first insulation layer; and

an inorganic a third insulation layer formed on and being in contact with said MHSQ layer and comprising a member selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride an inorganic material and formed on and adhering to a top of said second insulation layer; and

 a plurality of wires which are formed in grooves formed in said multi-layered insulation film, said MSQ layer, MHSQ layer and inorganic insulation layer of said multi-layered insulation film filling a space between said wires;

wherein said organosiloxane film comprises a methyl silsesquioxane (MSQ) layer, and said polysiloxane compound comprises a methylated hydrogen silsesquioxane (MHSQ) layer which adheres to said MSQ layer and said inorganic material.

2. (Canceled)

3. (Canceled)

4. (Canceled)

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5. (Currently amended) A semiconductor wafer, comprising:
a multi-layered insulation film formed on a surface of the wafer, said multi-layered insulation film comprising:

~~a methyl silsequioxane (MSQ) layer a first insulation layer comprising an organosiloxane film having a dielectric constant which is lower than a silicon oxide dielectric constant;~~

~~a methylated hydrogen silsesquioxane (MHSQ) layer formed on and being in contact with said MSQ layer a second insulation layer comprising a polysiloxane compound having an Si-H group and formed on and adhering to a top of said organosiloxane film of said first insulation layer; and~~

~~an inorganic e-third insulation layer formed on and being in contact with said MHSQ layer and comprising a member selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride an inorganic material and formed on and adhering to a top of said second insulation; and~~

a plurality of wires which are formed in grooves formed in said multi-layered insulation film, ~~said MSQ layer, MHSQ layer and inorganic insulation layer of said multi-layered insulation film filling a space between said wires;~~

~~wherein said organosiloxane film comprises a methyl silsesquioxane (MSQ) layer, and said polysiloxane compound comprises a methylated hydrogen silsesquioxane (MHSQ) layer which adheres to said MSQ layer and said inorganic material.~~

6. (Canceled)

7. (Canceled)

8. (Canceled)

9-30 (Canceled)

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31. (Currently amended) The semiconductor device according to claim 1, wherein a said dielectric constant of said MSQ first insulation layer is no greater than 3.5.

32. (Canceled)

33. (Canceled)

34. (Currently amended) The semiconductor device according to claim 1,
wherein said MSQ first insulation layer comprises a thickness greater than a thickness of
said MHSQ second insulation layer, and
wherein said MSQ first insulation layer comprises a thickness greater than a thickness of
said inorganic third insulation layer.

35. (Canceled)

36. (Canceled)

37. (Currently amended) The semiconductor device according to claim 1, wherein a bottom of
said grooves groove is formed on a same surface as said MSQ first insulation layer.

38. (Previously Presented) The semiconductor device according to claim 1, wherein said plurality
of wires comprise copper wires.

39. (Canceled)

40. (Previously presented) The semiconductor device according to claim 42, wherein said MHSQ
layer comprises a thickness of about 50 nm.

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41. (Currently amended) A semiconductor device having a damascene wiring structure, said semiconductor device comprising:

a multi-layered insulation film formed on a semiconductor substrate, said multi-layered insulation film having a plurality of recesses and comprising:

~~a methyl silsesquioxane (MSQ) layer a first insulation layer comprising an organosiloxane film having a dielectric constant which is lower than a silicon oxide dielectric constant;~~

~~a methylated hydrogen silsesquioxane (MHSQ) layer formed on and being in contact with said MSQ layer a second insulation layer comprising a polysiloxane compound having an Si-H group and formed on and adhering to a top of said organosiloxane film of said first insulation layer; and~~

~~an inorganic a third insulation layer formed on and being in contact with said MHSQ layer and comprising a member selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride an inorganic material and formed on and adhering to a top of said second insulation layer; and~~

~~an electroconductive film formed in a recess in said plurality of recesses, said MSQ layer, MHSQ layer and insulation layer of said multi-layered insulation film filling a space between recesses in said plurality of recesses;~~

~~wherein said organosiloxane film comprises a methyl silsesquioxane (MSQ) layer, and said polysiloxane compound comprises a methylated hydrogen silsesquioxane (MHSQ) layer which adheres to said MSQ layer and said inorganic material.~~

42. (Currently amended) A semiconductor device comprising a multi-layered insulation film and a plurality of wires formed on a semiconductor substrate, said multi-layered insulation film comprising:

~~a methyl silsesquioxane (MSQ) layer a first insulation layer comprising an organosiloxane film having a dielectric constant which is lower than a silicon dioxide dielectric constant;~~

~~a methylated hydrogen silsesquioxane (MHSQ) layer formed on and being in contact with~~

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~~said MSQ layer a second insulation, adhesive layer comprising a polysiloxane compound having an Si H group and formed on and being in contact with a top of said organosiloxane film of said first insulation layer; and~~

~~an inorganic a third insulation layer comprising a member selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride, an inorganic material and formed on and being in contact with said MHSQ layer a top of said second insulation, adhesive layer;~~

~~wherein said MSQ layer, MHSQ layer and insulation layer of said multi-layered insulation film fills a space between said wires in said plurality of wires, and~~

~~wherein said plurality of wires are formed in grooves which are formed in said multi-layered insulation film, and wherein said organosiloxane film comprises a methyl silsesquioxane (MSQ) layer, and said polysiloxane compound comprises a methylated hydrogen silsesquioxane (MHSQ) layer which adheres to said MSQ layer and said inorganic material.~~

43. (Currently amended) The semiconductor device according to claim 1, wherein ~~said MSQ layer, MHSQ layer and insulation layer first insulation layer, said second insulation layer and said third insulation layer of said multi-layered insulation film comprise uniform widths.~~

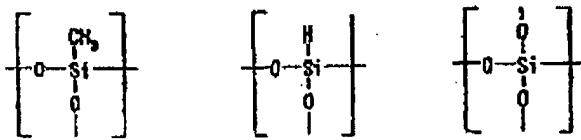
44. (Currently amended) The semiconductor device according to claim 1, wherein a surface of ~~said third insulation layer~~ is substantially coplanar with a surface of ~~said plurality of wires~~.

45. (Currently amended) The semiconductor device according to claim 1, wherein ~~said MHSQ second insulation layer is formed by one of a plasma CVD and a spin coating process where said semiconductor substrate is continuously maintained in a plasma atmosphere.~~

46. (Currently amended) The semiconductor device according to claim 1, wherein ~~said methylated hydrogen silsesquioxane (MHSQ) layer includes methylated hydrogen silsesquioxane (MHSQ) having repeating units shown by formulae I, II and III~~

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(I)

(II)

(III)

, and

wherein a molar ratio of II to a total of I, II and III is at least 0.2.

47. (Currently amended) The semiconductor device according to claim 1, wherein a thickness of a thickest portion of said MHSQ second insulation layer is less than a thickness of said MSQ first insulation layer.

48. (Canceled)

49. (Currently amended) A semiconductor device, comprising:
 a multi-layered insulation film formed on a semiconductor substrate having a plurality of grooves formed therein, said multi-layered insulation film comprising:
a methyl silsesquioxane (MSQ) layer a first insulation layer formed on a substrate and comprising an organosiloxane film having a dielectric constant which is lower than a silicon oxide dielectric constant;
a methylated hydrogen silsesquioxane (MHSQ) layer formed on and being in contact with said MSQ layer a second insulation layer comprising a methylated hydrogen silsesquioxane (MHSQ) layer having an Si-H group and formed on said organosiloxane film of said first insulation layer; and
an a-third insulation layer formed on and being in contact with said MHSQ layer and comprising a member selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride an inorganic material and formed on said second insulation layer; and
a plurality of wires which are formed in grooves formed in said multi-layered insulation film, said multi-layered insulation film filling a space between said wires,
wherein said organosiloxane film comprises a methyl silsesquioxane (MSQ) layer, and

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~~said methylated hydrogen silsesquioxane (MHSQ) layer adheres to said MSQ layer and said inorganic material~~

a plurality of gate electrodes formed on said semiconductor substrate; and
a plurality of impurity diffusion regions formed in the semiconductor substrate,
wherein said MSQ layer, MHSQ layer and insulation layer are formed on said plurality of
gate electrodes, and
wherein a space formed between adjacent gate electrodes in said plurality of gate
electrodes is filled with said MSQ layer.

50-52. (Canceled)

53. (Currently amended) The semiconductor device according to claim 1, further comprising:

a silicon nitride layer, said MSQ first insulation layer being formed on said silicon nitride layer and said plurality of grooves having a bottom defined by an upper surface of said silicon nitride layer.

54. (Canceled)

55-56. (Canceled)